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(12) UK Patent Application (19) GB (11) 2 057 044 A

(21) Application No **7929459**
(22) Date of filing **23 Aug 1979**
(43) Application published
25 Mar 1981
(51) **INT CL³**
F16B 2/04
(52) Domestic classification
E2A 300 306 371 378
414 GD
(56) Documents cited
GB 1444559
GB 1191134
GB 856766
GB 820739
GB 686152
GB 533123
GB 331074
(58) Field of search
E2A
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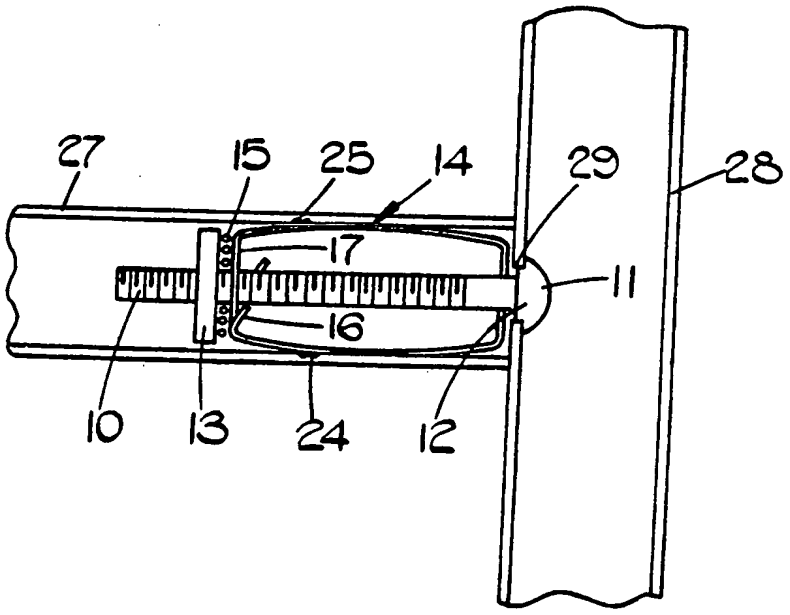
(54) **Connector device**

(57) A connector device which can be used to secure together two square section tubes 27 and 28 without requiring the use of a tool comprises a screw threaded rod 10 having a non-circular head 11 which engages in a rectangular hole 29 in tube 28. The rod 10 passes through apertures in a radially expansible blade spring element 14 of U-shaped form with internal portions 16 and 17. A nut 13 is mounted on the rod 10 and a compression spring 15 is disposed between the nut 13 and the element 14. The device is fixed in position by engaging the head 11 of the rod in the tube 28 and then inserting the tube 27 over the assembly of nut 13 and element 14 on the rod 10. Rotation of the tube 27 causes the nut 13 to advance along the rod 10 and radially expand the element 14 to engage the wall of the tube 27, barbs 24 and 25 being provided on the limbs of the element 14 to bite into the tube 27 to hold it securely in position.

FIG.2.



The drawings originally filed were informal and the print here reproduced is taken from a later filed formal copy.

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SPECIFICATION
Connector d vice

This invention relates to a connector device and is particularly, though not exclusively, concerned with a connector device for connecting together pre-cut lengths of tubing in, for example, the assembly of frames for trolleys, tables or shelving.

According to the present invention, there is provided a connector device for connecting a first, hollow element with a second element, said device comprising (a) a screw-threaded rod having a head having a non-circular portion so that it can be non-rotatably engaged in a non-circular hole in said second element; (b) an internally screw-threaded member engaged with said rod, said member having a non-circular external periphery; and (c) a resiliently expansible member which is mounted on said rod and which is expansible radially of the rod, the arrangement being such that, in use, the flexible member and screw-threaded member are engaged in the hollow in said first element with the flexible member being disposed between the screw-threaded member and a surface of said second element surrounding the non-circular hole therein whereby, upon relative rotation of the first and second elements, the screw-threaded member advances along the screw-threaded rod and so causes the flexible member to be radially expanded so that it engages an internal surface of said first element and locks relative to said second element.

With above-described connecting device, no tools are required in order to lock the two elements together. The invention is particularly applicable to the case where said second element is hollow and access to the head by a tool such as a screwdriver or spanner is difficult or impossible because the head is disposed in the hollow of the second element.

It is particularly preferred to provide a spring between the screw-threaded member and the flexible member so that the spring engages one end of the flexible member and resiliently biasses the flexible member into engagement with the head. With such an arrangement, the spring will hold the connecting device relatively firmly once the head has been engaged with said second element prior to the first element being engaged over the screw-threaded member and flexible member and the latter being radially expanded.

It is particularly preferred for the flexible member to comprise a configurated sheet metal spring which is provided with at least one barb thereon to bite into an internal surface of the first element so as to oppose sliding movement of the latter relative to the screw-threaded rod.

An embodiment of the present invention will now be described, by way of example, with reference to the accompanying drawing, in which:—

Fig. 1 is a schematic side view of one embodiment of connecting device according to the present invention, and

Fig. 2 is a schematic view of the connecting device of Fig. 1 shown in operation.

Referring to the drawing, the connecting device comprises a screw-threaded rod 10 having a head 11 which has a generally elongate rectangular outline when viewed in the direction of arrow A in Fig. 1 and which also includes a rod-adjacent portion 12. The rod-adjacent portion 12 is of generally diamond-shaped outline but has a pair of flats on opposite sides thereof. These flats lie in the same plane as the respective sides of the main portion of the head 11. The device further includes a square nut 13, a configurated blade spring element 14, and a tapered spring 15. As can be seen from the drawing, the blade spring element 14 is disposed between the nut 13 and the head 11 whilst the tapered spring 15 is disposed between the element 14 and the nut 13.

The blade-spring element 14 is of generally U-shaped section with a respective inturned portion 16, 17 at the free end of each limb 18, 19 of the U-shaped blade spring element 14. The head-adjacent end or base 20 of the U-shaped blade spring element 14 has a circular aperture 21 therethrough which receives the screw-threaded rod 10 with clearance. Each of the inturned portions 16 and 17 also has a respective circular aperture 22, 23 therethrough. Each aperture 22, 23 has a substantially greater diameter than that of the rod 10 so that radial movement of each portion 16, 17 relative to the axis of the rod 10 is permitted. Thus, a limited amount of radial flexing of the limbs 18 and 19 relative to the rod 10 is permitted. Each limb 18, 19 has a respective barb formation 24, 25 extending from its outer surface, each barb formation 24, 25 being formed by a plunging operation on the blade. As can be seen from Fig. 1, in an at-rest or unstressed condition of the element 14, the inturned portion 16 lies at an acute angle to the general plane of the limb 18 whereas the inturned portion 17 lies substantially at right-angles to the general plane of the limb 19. The thickness of the material of construction of the blade spring element 14 is slightly less than the pitch of the screw-threading on the rod 10 and this feature together with the feature that the limbs 18 and 19 and thus the portions 16 and 17 are inherently biassed outwardly means that the limb remote ends of the portions 16 and 17 are urged loosely into engagement with the screw-threading. This assists in preventing unwanted detachment of the element 14 from the screw-threaded rod 10 during the assembly of the device.

The above-described device is intended for connecting together two square cross-section extruded aluminium alloy tubes 27 and 28 such that one end of the tube 27 extends perpendicularly from one side wall of the tube 28. For this purpose, an elongate, rectangular hole 29 is provided through said one side wall of the tube 28, the size of the aperture 29 being such that, in one angular orientation of the head 11, the latter can be passed through the hole 29. When at 90° to this angular orientation, the head 11 overlaps the hole 29 and so is prevented from being

each of the internal portions having apertures therethrough and the rod passing through the apertures.

5. A connector device substantially as hereinbefore described with reference to the accompanying drawings.

Printed for Her Majesty's Stationery Office by the Courier Press, Leamington Spa, 1981. Published by the Patent Office, 25 Southampton Buildings, London, WC2A 1AY, from which copies may be obtained.